THE OFFICE OF THE STATE CHIEF INFORMATION OFFICER
ENTERPRISE TECHNOLOGY STRATEGIES

North Carolina Statewide Technical Architecture

Groupware Domain

Groupware Domain

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GroupWare - Content Exchange

Best Practice 6.01.01 Avoid proprietary formats in anticipation of document exchange with outside users and applications.

Rationale:

- ❑ Proprietary formats inhibit document exchange, and may create future barriers to communication.
- ❑ If proprietary formats are used, the capability must be provided to convert documents to standard formats for content exchange. Any vendor using proprietary formats should provide a conversion routine.

GroupWare - Content Exchange

Standard 6.01.01 For non-editable documents, the standard file format is PDF. Typical application software using this file format includes word processing, imaging systems, and World Wide Web publishing.

Rationale:

- ❑ PDF is widely deployed for non-editable content exchange.
- ❑ The reader is available at no cost.

GroupWare - Content Exchange

Standard 6.01.02 For monochrome documents or drawing, the standard file format is TIFF using CCITT/ITU Group IV Compression.

Rationale:

- ❑ Typical application software using this file format include: word processing, archive and retrieving, workflow, mulitmedia, medical systems, digital publishing, pattern recognition, and geographic information systems.

GroupWare - Content Exchange

Standard 6.01.03 For color documents, drawings, or photographs, the standard file formats are GIF and JPEg.

Rationale:

- ❑ Typical application software using this file format includes multimedia, work processing, medical systems, digital publishing, and geographic information systems.

GroupWare - Content Exchange

Standard 6.01.04 For facsimile documents, the standard file format is TIFF using CCITT/ITU Group III compression.

Rationale:

❑ Typical application software using this file format includes work processing, archival and retrieval, and workflow.

GroupWare - Content Exchange

Standard 6.01.05 - For vector or geometric data, the standard file formats are DGN and DWG.

Rationale:

❑ Typcal application software using this file format includes CADD and geographic information systems.

GroupWare - Content Exchange

Standard 6.01.06 For multiple images, the standard file format is MPEG-1.

Rationale:

❑ Typical application software using this file format is multimedia.

GroupWare - Electronic Mail

Best Practice 6.02.01 Email servers should be administered and managed as a part of the strategic infrastructure.

Rationale:

❑ A properly structured email system can provide the state with a comprehensive, effective, inexpensive, and widespread method of communication, while permitting a choice of email clients.
❑ Email is a valuable tool because it provides the structure for easily moving messages and attachments in a timely manner between clients, thereby increasing workflow and productivity.
❑ Email service should be available at all times from any location. Time, distance, and location should not restrict email service.

GroupWare - Electronic Mail

Standard 6.02.01 Use Simple Mail Transport Protocol (SMTP).

Rationale:

❑ Simple Mail Transport Protocol (SMTP) is the standard transport protocol for sending messages from one MTA to another MTA over the Internet. Using MIME encoding, it enables the transfer of text, video, multimedia, images, and audio attachments. It is the predominate transfer protocol utilized by web browser-based email user agents.

GroupWare - Electronic Mail

Best Practice 6.02.02 Email servers should support multiple email clients.

Rationale:

❑ A properly structured email system can provide the state with a comprehensive, effective, inexpensive, and widespread method of communication, while permitting a choice of email clients.

GroupWare - Electronic Mail

Standard 6.02.02 Use Multi-purpose Intenet Mail Extensions (MIME)

Rationale:

❑ Multi-purpose Internet Mail Extensions (MIME), a SMTP message structure, is the standard specification for the attachment of audio, video, image, application programs, and ASCII text messages. The content type is stored in the message header as mail extensions. When the message is delivered, the player or application specific to the content type is opened so that the attachment can be viewed in its native format. If the player or application is not included with the browser, then the user must load it. Common image and video players are included with most browsers.

❑ The MIME standard will require standardization of certain protocols in the near future. By its definition, MIME is transformable. Although two applications may be MIME-compliant, each application can use a proprietary or custom set of extensions. The data associated with the proprietary extensions may be lost in transfer. Common protocols cut down on the risk of a loss of data occurring.

GroupWare - Electronic Mail

Standard 6.02.03 Use Internet Message Access Protocol version 4 (IMAP4).

Rationale:

❑ Internet Message Access Protocol version 4 (IMAP4) is the standard protocol for access to the mail server. The user has the option of storing and manipulating messages on the mail server, which is important for job functions that require the user to access mail from several different clients. IMAP is also ideal for situations where the user has a low speek link to the mail server. Instead of downloading all messages to the client, IMAP allows the user to select which specific messages to download. If a message has several MIME attachments, the user can specify that only the text portion of the message is to be downloaded for viewing. This practice is considerably more efficient in the event that a high-speed link is not readily available.

❑ Note: Options sometimes exist to configure mail servers and clients without IMAP4 settings. Email servers and clients should be implemented using IMAP4.

GroupWare - Electronic Mail

Best Practice 6.02.03 Select a C&S application that allows the user to create both public and private notification groups and contact lists.

Rationale:

❑ Public and private notification groups are lists of people and/or resources that have common calendar and schedule needs, such as project groups or a list of conference rooms. Users can assign selected individuals to their private groups, and administrators can assign selected

individuals to public groups. When a group name is entered as a participant, available times can be selected based on the group's information, and a notification message is forwarded to all individuals included in that group. This feature streamlines the use of C&S applications, making them more efficient.

GroupWare - Electronic Mail

Best Practice 6.02.03 Use a common email directory service throughout the state.

Rationale:

- ❑ An enterprise-wide email directory service should be accessible by everyone within the organization. The statewide directory service should be a seamless integration of each agency's directory service. If a user in one agency requests an email address for a user in another agency, the action should be transparent, without the requester knowing where in the organization the address is stored.
- ❑ The directory service should be compatible with the directory services of other components in the network. Other applications require use of an email directory service. Use of a single directory service will facilitate reuse of information and directory access routines. It is necessary for heterogeneous components to access the directory service.
- ❑ For more information about directory services, refer to the Directory Service sub-topic in this chapter.

GroupWare - Electronic Mail

Best Practice 6.02.04 Select a C&S application that enables task and resource management.

Rationale:

- ❑ In addition to people, the user must have the ability to schedule facilities and equipment. For example, the user should be able to reserve a meeting room and an overhead projector through the C&S Application.
- ❑ The C&S application should be capable of tracking tasks (e.g. "To Do" lists that automatically send reminder messages for upcoming deliverables

GroupWare - Electronic Mail

Standard 6.02.04 Use Lightweight Directory Access Protocol (LDAP).

Rationale:

- ❑ Lightweight Directory Access Protocol (LDAP) is the standard directory access protocol. LDAP is based on Directory Access Protocol (DAP), and X.500 standard access protocol. X.500 is a set of CCITT/ITU standards for electronic directory services. LDAP has been proven to be more efficient for MUA to directory services transactions. In addition, LDAP can be utilized to access databases other than the email directories, which will add value to other groupware applications, such as scheduling.

GroupWare - Electronic Mail

Standard 6.02.04 Plan for adaptability to accommodate future changes in the email environment.

Rationale:

- ❏ Protocols are constantly evolving. It is best to use applications that easily adapt to changes in the environment without requiring a high degree of custom or proprietary code. Applications should be capable of supporting multiple protocols and services.
- ❏ New technology is being rapidly developed and perfected. In the near future, the marriage of email and telephony will be complete. It is prudent to purchase applications today that can readily be re-configured to accept the technologies of tomorrow. The email system should grow stronger with future changes, not slip into obsolescence.

GroupWare - Electronic Mail

Standard 6.02.05 Select an email server system that allows multiple standards-based email clients.

Rationale:

- ❏ When an email server uses IMAP4 standard, any IMAP4-base client can access that server.

GroupWare - Electronic Mail

Standard 6.02.05 Select an email client that includes standard APIs for email-enabling other applications.

Rationale:

- ❏ Email is a key component of workflow. If a user is working on a document and chooses to send that document to another user, the user should not have to close the document creation application and open email to send it. Instead, the user should be able to mail the document directly from the native application.
- ❏ Calendaring and scheduling applications can use mail message delivery for meeting proposals.
- ❏ Common APIs in use today are the messaging application programming interface (MAPI) , vendor independent messaging (VIM), and common messaging calls (CMC).

GroupWare - Electronic Mail

Best Practice 6.02.05 Select a C7S application that allows remote and proxy access.

Rationale:

- ❏ The user should be capable of disconnecting from the network and still maintain access to personal and shared calendars. Any updates to the calendars or schedule notifications made while the user is offline should be uploaded and synchronized at the time that the user reconnects to the network.
- ❏ Incoming schedule notifications should be held by the C&S server until the user reconnects to the network at which time the messages are synchronized with the user's local calendar.
- ❏ Proxy access enable a C&S user to allow another authorized user or users to administer their personal calendar. This function may be limited to viewing, or allow full maintenace capabilities.

GroupWare - Electronic Mail

Best Practice 6.02.06 Select a C&S application that can be accessed through a web front-end.

Rationale:

- ❑ Both Intranets and Internets are accessible by anyone within the organization via a web-browser. Web enabled C&S applications allow users access to C&S information for anyone, anywhere in the state.

GroupWare - Electronic Mail

Standard 6.02.06 Implement security for email message transport and storage

Rationale:

- ❑ Private and official correspondence will require varying degrees of protection including authentication and encryption. SMTP/MIME was created as a means of "casual" communication over the Internet. It was not created to be a completely secure medium. Protocols are currently being developed bridge the security gap.

GroupWare - Calendar and Scheduling

Best Practice 6.03.01 Select an open C&S application, which maintains transparent interoperability with other C&S applications and computing platforms used across the state.

Rationale:

- ❑ The C&S system must be capable of supporting multiple server platforms and client platforms. The operating environment within the state is, and will remain, heterogeneous. The C&S system must therefore be capable of transparently transferring schedules and meeting information across each of the operating systems.
- ❑ C&S applications are typically purchased independently by each agency based on the particular needs that the agencies must satisfy. The selected applications must be capable of exchanging schedules, notifications, and material with the C&S applications utilized by other agencies. The use of one application must be capable of viewing a user's calendar created and stored on another application.

GroupWare - Calendar and Scheduling

Standard 6.03.01 There are currently no standards pertaining to this technical topic.

Rationale:

- ❑ There are curently no standards pertaining to this technical topic.

GroupWare - Calendar and Scheduling

Best Practice 6.03.02 Select a C&S application that provides a mechanism for attaching supporting documentation, such as meeting materials, to the notification message.

Rationale:

❑ The capability to include or attach meeting agendas, supporting documentation, and deliverables maximizes the efficiency of C&S as a productivity tool.

❑ The user should not be required to compose a separate email message to send attachments. The transport mechanism for attachments should be accessible from the scheduling application.

GroupWare - Document Management

Standard 6.04.01 Conform to NC Government Information Locator Service (NC GILS).

Rationale:

❑ Where applicable EDM applications, databases, and repositories, should be designed to interface with and conform to North Carolina Government Information Locator Service (NC GILS) standards being promulgated by the NC Office of State Planning (OSP).

❑ The U.S. government created a government information locator service (NC GILS) to assist in locating information from federal, state, or local government agencies. This service is an electronic "card catalog," describing and indexing information available from federal agencies. By following internationally recognized standards, (the information search and retrieval service and protocol standard, ANSI/NISO (Z39.50), the information supplied by the disparate agencies includes the same content items and is available for searching electronically with information retrieval software via the Internet. The GILS standard has been adopted by several states and foreign countries, which makes it the foundation of a global information locator service.

❑ As a result of Exective Order 100 from Governor Hunt, North Carolina is developing a government information locator service compliant with the federal GILS. North Carolina's implementation of GILS is called NC GILS.

❑ State and local agencies in North Carolina are required by the Public Records Law (North Carolina G.S. 132-6.1 (b)) to index all databases created or significantly modified after a certain date. NC GILS provides a means to output the indexing information in a standard way to allow searching across agencies and across other state, local, and federal agencies and political jurisdictions. Thus, NC GILS will link public database indexes created in response to the amended Public Records Law to indexes developed by the federal government, other states, and other counties, to provide for the global exchange of public information. OSP is currently working with State Public Records Cataloging Services to determine indexing standards as they relate to documents.

❑ For more information about NC GILS, refer to the web site: http//www.ncgils.state.nc.us/NCGILS.

GroupWare - Document Management

Best Practice 6.04.01 Evaluate potential requirements over a longer term basis and implement a "platform" that can be used to develop document-enabled applications and provide a uniform approach to document storage and access.

Rationale:

❑ Use the standards guidelines to assure the implementation of "scalable," open systems.

GroupWare - Document Management

Standard 6.04.02 Conform to NC Public Records Law.

Rationale:

❑ The development of EDM systems, management of public records, and explosion of e-mail means that system design efforts and policy and procedure as to the processing, routing, retention, and disposition of data and documents must be accomplished with respect to public law.

❑ Any database that falls under the Public Records Law (North Carolina 132-6.1 (b) and G.S. 121) must be included in the State Public Records Cataloging Services (SPRCS) under the development of Cultural Resources (DCR).

❑ SPRCS was developed by the Division of Archives and History as a series of guidelines, catalog services, procedures and data used by the SPRCS work unit in managing North Carolina's public records.

❑ For more information about SPRCS, refer to the web site: http//www.spr.dcr.state.nc.us

GroupWare - Document Management

Best Practice 6.04.02 Assure the availability of open application program interfaces.

Rationale:

❑ Adhere to APIs and integration standards being advanced by the Association for Information and Image Management.

GroupWare - Document Management

Standard 6.04.03 Implement document management systems and components that conform to the Document Management Alliance specifications (DMA 1.0 and ODMA 2.0).

Rationale:

❑ There are numerous issues related to interoperability among document management applications, services, and repositories. Standards are needed to manage the increased life expectancy and complexity of re-usable electronic documents and content.

❑ The Document Management Alliance (DMA), is a task force of AIIM. DMA conforming products will supports open design for user interfaces, workstations, network operating systems and services. The DMS provides a framework for vendors to deliver products that provide query services (simple transparent access from every desktop to information anywhere on the network), and library services (including check-in and checkout, version control, security, and accountability). The DMA is working with the Open Document Management API (ODMA) group which specifies the common application program interfaces, and high level call interfaces that enable other client applications (such as MS Office) to work seamlessly with DMA compliant document management systems.

❑ For more information about AIIM standards programs, refer to the web site: http//www.aiim.org/industry/standards.

GroupWare - Document Management

Standard 6.04.03 Execute a "pilot" project based on an identified business need and defined business process rather than just a pilot of technology.

Rationale:

- ❑ A pilot project will provide an early demonstration of success and allow an organization to begin to absorb and understand all the business cultural isssues associated with the concepts of EDM, workflow, and knowledge management.
- ❑ These concepts are changing the traditional ways of thinking about business applications. Business processes will most likely need some level of redesign.
- ❑ For imaging applications, many organizations start with records management requirements; the need to create a permanent record of paper files that would otherwise be boxed and sent to archives. The existiing business workflow will require changes introduced by technology. Even a simple records application may require 1) scan, 2) quality control, 3) re-scan, 4) index, 5) verify, 6) commit to permanent storage.

GroupWare - Document Management

Standard 6.04.04 Implement workflow systems that conform to the interface specifications of the Workflow Management Coalition (WfMC).

Rationale:

- ❑ WfMC is another working group of AIIM and is closely aligned with the work of the DMA. As automated workflow systems continue to evolve, the complexities associated with a common approach to process definition, process repositiories, object manipulation and transport, and user interfaces are enormous. The Workflow Management Coalition (WfMC) has proposed a framework for the establishment of workflow standards. This framework includes five categories of interoperability and communication standards that will allow multiple workflow products to coexist and inter-operate within a network environment. This framework is contained within a Reference Model for workflow management systems that includes five interface specifications. The model includes the following:
  - o   - Process Definition Tool.
  - o   - Workflow Enactment Services.
  - o   - Workflow Client Applications.
  - o   Invocation of Native Applications.
  - o   Workflow Package Interoperability
- ❑ At this time, there are many companies designing products that comply with one or more of these interface specifications. Agencies plannning production workflow applications that need to route work outside of the production system for processing or decision making should work carefully with vendors and service providers to determine functional requirements and WfMC standards compliance.
- ❑ For more information about the WfMC and the work of the coalition refer to the Web site at: http://www.aiim.org/wfmc/index.html.

GroupWare - Document Management

Best Practice 6.04.04 Define business processes as conversational procedures, not according to information/data flow.

Rationale:

- ❑ If the process cannot be described step by step language, it cannot benefit from automation.
- ❑ Specify document handling and workflow as a series of conversations.
- ❑ Use structured methods.
- ❑ Draw simple pictures.
- ❑ Use a conventional template.
- ❑ Never model the information flow.

GroupWare - Document Management

Standard 6.04.05 Use Adobe Acrobat Portable Document Format (PDF) for Non-editable Electronic Documents.

Rationale:

All documents in final form are prepared for distribution and publishing with no intention for further modification must be stored and delivered in Adobe PDF format.
- ❑ For more information about PDF refer to the web sites:
- ❑ http://www.state.nc.us/adobe/irmc1.htm
- ❑ http://www.abobe.com/prodindex/acrobat/adobepdf.html

GroupWare - Document Management

Best Practice 6.04.05 Be prepared to modify processes based on lessons learned from EDMS and workflow applications.

Rationale:

- ❑ With this technology, business processes will usually change by collapsing a sequence of steps into a smaller number of parallel steps.

GroupWare - Document Management

Standard 6.04.06 Ensure hardware/software and image file compatibility using TWAIN, ISIS, and TIFF Standards.

Rationale:

- ❑ For typical business document imaging applications, software that controls the operation of the scanner (and some other recognition peripherals) is provided. Not all scanner hardware and scan software are compatible. The industry standards to adhere to are TWAIN and more recently ISIS (Image and Scanner Interface Specification).
- ❑ The scanned images of typical business documents should be committed to storage in Tagged Image File Format (TIFF) Version 6.0 using CCITT/ITU Group III or IV compression. Organizations planning imaging applications should investigate and demonstrate that any product selected is capable of exporting images in a format that they can be reused. Images that can not be shared are a wasted investment and could result in the loss of critical data.

❑ Avoid new deployment or migrate away from proprietary image file formats. The current technology direction for image file format is TWAIN. The emerging technology file format is ISIS.

GroupWare - Document Management

Best Practice 6.04.06 Avoid co-mingling manual and automated processes or design clear boandaries and assure accountability for the correctness and completeness of manual steps.

Rationale:

❑ The goal of EDM is to enable the complete automation of day-to-day processes and combine legacy systems with the paperwork (probably images, may be other types of e-docs) that is linked to them. These processes must first be identified and documented to provide a means of analysis.

❑ Some documents are not suitable for being processed electronically. The feasibility for each document type to be processed electronically must be determined.

❑ The business rules and procedures must be able to allow processing the majority of a workflow electronically. Switching from electronic to manual processing within a business process will be efficient and leave a larger margin of error.

GroupWare - Document Management

Standard 6.04.07 Select magnetic storage subsystems that adhere to state convenience contract specifications. Select optical storage subsystems based on smaller standard form factors.

Rationale:

❑ Typical electronic documents, created with office automation suites, will reside on industry standard magnetic disk that is server or network attached. This will generally be transparent to the users of the EDMS. The images of scanned paper documents might also be stored on standard network attached magnetic disk. Magnetic storage will always provide the most performance in the speed of retrieval, and magnetic disk is increasing cost competitive with optical disk storage. When selecting any magnetic storage solution, adhere to other parts of the STA that provide the standards for these types of systems.

❑ Very large document collections (usually image applications) will probably require optical storage subsystems (many are proprietary)   Where there is a requirement for the permanent storage of unalterable documents, optical is chosen in the form of Write Once Read Many (WORM) disks. These types of systems generally involve special software that is used to manage the storage and movement of documents from optical to magnetic when documents are requested by users. Optical disks may be mounted in single standalone drive units or they may be loaded into various sizes of "juke boxes." Software handles the retrieval and loading of specific disks in response to user requests. Typical EDMS systems today will use a 51/4 form factor and will be WORM or Compact Disk type formats.   Larger disks are available for specialized applications and are generally proprietary.

GroupWare - Document Management

Best Practice 6.04.07 Match the selected tools to the mission requirements.

Rationale:

- ❑ Select application components that provide production or transaction-oriented capabilities and ad-hoc capabilities, or recognize the differences between systems/products that are designed for one or the other. Also, consider the scale of the requirements. The components required for the administration of a small office are very different than those needed for the administration of the state's retirement programs.
- ❑ Process oriented workflows automate definable, repetitive and well-understood programs and procedures. The automation of these processes provide efficient flow of events and automated management of the process.
- ❑ Ad hoc workflows accommodate short lived, unstructured processes. These flows provide flexibility in the work process.

GroupWare - Document Management

Standard 6.04.08 Use eXtensible Markup Language (XML 1.0) when capturing or authoring document content that requires further automated processing by other information systems and web based clients using standard XML enabled browsers.

Rationale:

- ❑ This standard is promulgated by the World Wde Web Consortium (W3C).
- ❑ XML is a subset of the Standard Generalized Markup Language (SGML, and ISO standard).
- ❑ XML encodes a description of a document's storage layout and logical structure with a document type definition (DTD). It provides a mechanism to combine structured data and unstructured information content.
- ❑ XML allows information systems and applications to automatically process XML documents when the systems are combined with an XML processor.
- ❑ The specification (DTD) describes the required behavior of XML processors in terms of how they read XML documents, and what information they must provide to the processing application. For more information about W3C and XML refer to the Web site: http://w3.org
- ❑ The entire contents of the XML 1.0 specification are at: http://www.w3.org/TR/1998/REC-xml-19980210.

GroupWare - Document Management

Best Practice 6.04.08 Select EDM and workflow tools that comply with AIIM open standards, are platform independent, and can be shown to be inter-operable with similar tools and other components of the statewide technical architecture.

Rationale:

- ❑ Selecting application components that adhere to industry standards is important for flexibility and adaptability.
- ❑ Products must support mulitple server, workstation, and application platforms.

❏ Workflow components should trigger or send some message-based notification when human intervention is needed (using middleware, email, etc) Partial automation of the office environment will cause confusion as to which activities need human initiative and which activities are being managed by the workflow system. This confusion will cause inefficiencies and leave a wider margin of error in work to be performed.

❏ Workflow systems should provide a standard interface to other workflow systems for the purpose of passing and processing work items between business units and processes.

GroupWare - Document Management

Best Practice 6.04.09 Select tools that enable reporting of production statistics, real time monitoring of work-in-process, and that reporting for longer-term process performance metrics.

Rationale:

❏ Tools should collect and report metrics.

❏ Standard or customizable reports should provide detailed information about documents and work items for the duration of their existence.

❏ With process automation, identification of inefficiences and bottlenecks can be enabled. While automation speeds up the process, it can also cause too much work to be distributed to a number of people that are unable to process that work effieciently. EDM and workflow should be able to identify problems and thus provide management with the opportunity to balance and modify workflow as needed. The balancing of work queues and prioritization of work distribution can occur. This can ensure that no staff member is left without work while another is backlogged.

GroupWare - Document Management

Best Practice 6.04.10 Determine the various levels of access privileges that users will require, and select products that are tightly integrated to operating system access and security parameters.

Rationale:

❏ The public should have view-only access to documents. However, public users need to be provided with a mechanism to automatically generate inquires and requests for service.

❏ In order for the EDMS to improve document collaboration, a document owner must be capable of granting another user permission to edit a document. The EDMS should automatically track and report all events related to the manipulation and flow of documents.

GroupWare - Document Management

Best Practice 6.04.11 As they pertain to electronic document management, adhere to the Application and Data Architecture guidelines in the statewide technical architecture.

Rationale:

❏ The development process for document enabled applications is not that different than for traditional database applications. EDM systems and components simply provide a more

specialized environment for working with information in formats different from tradional hardcopy and computer displays. Existing and emerging products are very compatible with the state's n-tier architecture.

GroupWare - Document Management

Best Practice 6.04.12 Select workstations, servers, and peripherals with the specific needs of different types of users in mind.

Rationale:

- ❑ Typical workstations used for office automation suites may not be sufficient for many types of e-docs.
- ❑ For imaging applications, take into account technical requirements of data compression, quality assurance, and dual page viewing. Generally, imaging applications will require higher performance for servers, to network, to various types of specialized workstations (eg, scanning, viewing, faxing, and printing).

GroupWare - Document Management

Best Practice 6.04.13 A cost-effective strategy for indexing business documents requires development of a comprehensive indexing scheme containing standard naming conventions.

Rationale:

- ❑ The indexing scheme should contain the minimum standard items as required by the State Public Records Cataloging Service and the Office of State Planning.
- ❑ The scheme should apply to all types of documents in the organizatoin regardless of their physical format.

GroupWare - Document Management

Best Practice 6.04.14 Consider the need, cost, and resources associated with the conversion of records backfiles, either on paper or on microfilm/fiche.

Rationale:

- ❑ Large collections may cost more to convert than the EDM/Imaging system itself.
- ❑ A more cost-effective approach for paper archives would be to provide an electronic index to the paper only, and use traditional disposition and permanent storage methods.